

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
2 October 2003 (02.10.2003)

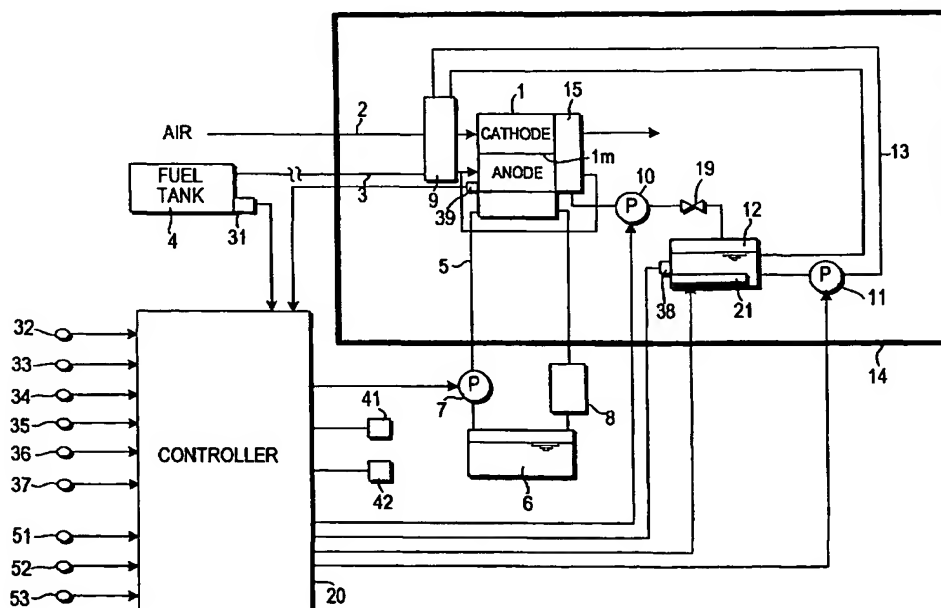
PCT

(10) International Publication Number
WO 2003/081704 A3

- (51) International Patent Classification⁷: **H01M 8/04** [JP/JP]; 1-13-14, Yoshii, Yokosuka-shi, Kanagawa 239-0804 (JP).
- (21) International Application Number: **PCT/JP2003/002198** (74) Agent: **GOTO, Masaki**; Shoyu-Kaikan, 3-1, Kasumigaseki 3-chome, Chiyoda-ku, Tokyo 100-0013 (JP).
- (22) International Filing Date: 27 February 2003 (27.02.2003) (81) Designated States (*national*): CN, KR, US.
- (25) Filing Language: English (84) Designated States (*regional*): European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR).
- (26) Publication Language: English
- (30) Priority Data: 2002-88075 27 March 2002 (27.03.2002) JP Published: — with international search report
- (71) Applicant (for all designated States except US): **NISSAN MOTOR CO., LTD.** [JP/JP]; 2, Takara-cho, Kanagawa-ku, Yokohama-shi, Kanagawa 221-0023 (JP). (88) Date of publication of the international search report: 10 June 2004
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- (75) Inventor/Applicant (for US only): **OGAWA, Solchiro**

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **FREEZE PROTECTION FUEL CELL SYSTEM**



(57) Abstract: A system has two modes which protect it from freezing of water while a fuel cell stack (1) has stopped. An effective protection mode from the viewpoint of energy consumption is selected based on the estimated restart time and outside air temperature shift, and used to protect the system. The protection modes are: a first protection mode which prevents freezing by heating the water supplied to the fuel cell (1), and a second protection mode which avoids freezing of water in the fuel cell (1) by discharging the water in the fuel cell (1) to outside the fuel cell (1), and freezing the water outside the fuel cell (1).

INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 03/02198

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01M8/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 02/01662 A (EMITEC EMISSIONSTECHNIK ; KONIECZNY JOERG ROMAN (DE); BRUECK ROLF (DE)) 3 January 2002 (2002-01-03) claims 1-7	1-17
A	WO 96/41393 A (BALLARD POWER SYSTEMS ; STRASKY DOUGLAS G (CA); GORBELL BRIAN N (CA);) 19 December 1996 (1996-12-19) figures 1-3	1-17
A	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 10, 30 November 1995 (1995-11-30) & JP 7 169476 A (TOSHIBA CORP), 4 July 1995 (1995-07-04) cited in the application abstract	1-17
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☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

11 March 2004

Date of mailing of the international search report

19/03/2004

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 03/02198

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>PATENT ABSTRACTS OF JAPAN vol. 1997, no. 02, 28 February 1997 (1997-02-28) & JP 8 273689 A (TOYOTA MOTOR CORP; AISIN SEIKI CO LTD), 18 October 1996 (1996-10-18) cited in the application abstract</p> <p>-----</p>	1-17
L	<p>WO 03/073547 A (NISSAN MOTOR ; UTC FUEL CELLS LLC (US)) 4 September 2003 (2003-09-04) page 6, line 14 - page 9, line 23 page 11, line 33 - page 12, line 7 claims 30,40-45 figures</p> <p>-----</p>	1-17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 03/02198

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0201662	A	03-01-2002	DE 10031062 A1	17-01-2002
			CA 2414591 A1	03-01-2002
			WO 0201662 A1	03-01-2002
			EP 1295352 A1	26-03-2003
			JP 2004502282 T	22-01-2004
			US 2003129461 A1	10-07-2003
WO 9641393	A	19-12-1996	AU 5807296 A	30-12-1996
			WO 9641393 A1	19-12-1996
			DE 29623879 U1	04-05-2000
			DE 69603608 D1	09-09-1999
			DE 69603608 T2	17-08-2000
			EP 0842548 A1	20-05-1998
JP 7169476	A	04-07-1995	NONE	
JP 8273689	A	18-10-1996	NONE	
WO 03073547	A	04-09-2003	US 2003162063 A1	28-08-2003
			WO 03073547 A2	04-09-2003